REMARKS

Claims 1-6 and 8-17 are all the claims pending in the application.

Initially, the Examiner is respectfully requested to indicate that the drawings submitted on April 9, 2004 have been accepted.

I. Response to Rejection of Claims 1 and 2 under 35 U.S.C. § 103(a)

Claims 1 and 2 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Smits (4,359,481) and Fessmann (UK 1,137,637).

Applicants respectfully traverse the rejection.

Claim 1 is directed to a fish processing method comprising generating a smoking material from a smoke generating device, into which no air is introduced from a cast portion for feeding the smoke material and smoke discharge path, removing at least one unnecessary substance selected from the group consisting of soot and tar from the smoking material under a condition where air is interrupted or air is not introduced, bringing, at a normal pressure or a pressurized condition, the smoking material into contact or into mixing contact by a mixer with at least one of water, a solution or a solution comprising at least one additive selected from the group consisting of an antioxidant, a pH adjuster and a condiment to dissolve a smoke dry component to form a smoking liquid , and applying the smoking liquid to a fish to produce a smoke dried product.

It is respectfully submitted that air is introduced in the smoke generator of Fessmann.

There are a wide variety of machines that are able to manufacture smoke and they differ in terms of the methods used, as well as their characteristics relating to the target of application. Examples of known methods for producing smoke include direct heating, indirect heating, steam heating, and friction heating. In its use of steam, the smoke producing device of Fessmann is recognized as belonging to a different genre (source: Food Science).

There are major differences between Fessmann and the present invention.

1. Method for preventing entrainment of air

In the present invention, to prevent air from being entrained when the wood material is delivered is achieved by a means for compressing the smoking material together with the wood particulate using a screw and increasing the density of the smoking material, thereby continuously preventing the entrainment of air. By contrast, the structure of Fessmann is one where the smoking material is delivered via a dumper, and then the dumper is closed. This structure does not prevent air from being entrained together with the smoking material (sawdust) as those actions are repeated.

Thus, contrary to the Examiner's position, Fessmann does not disclose a smoke generating device, into which no air is introduced from a cast portion for feeding the smoke material and smoke discharge path, as recited in claim 1.

Additionally, the present invention is able to compress sawdust in the hopper using screw pressure, and generate smoke that is almost completely the same as experimental-grade dry-distilled smoke.

However, Fessmann discloses the use of a neutral gas. There are many gases that are neutralized by substances contained in smoke components and exhibit disinfecting, aromatizing, color-stabilizing, or other smoke-related effects. However, they can also contain large amounts of toxic substances, as well as substances that are prohibited from being used as foodstuff additives.

400 or more types of components are present in smoke in the form of complexes, most of which have an impact on the human body when present in high concentrations. Accordingly, it has been socially acceptable to use smoke in amounts shown over time to be safe. However, when other gases are to be admixed, they must be disclosed for purposes of safety.

With the neutral gas used in Fessmann, a large volume of wet steam is contained as smoke gas only. Therefore, assuming that reducing the smoke components is to be encouraged, and a neutral gas introduced when so required.

The HACCP of the USA contains a definition wherein smoke is described as being obtained by the burning of wood.

2. Heating methods (direct heating using steam and indirect heating via a cylinder)

The present invention is based on what is typically known as an indirect model, which is characterized in that a heater or the like is used to apply heat from outside of a cylinder, and components of the heat source are prevented from being entrained. Fessmann, in contrast, involves bringing dry steam into direct contact with the wood material, and is thus characterized as being a steam-type method of direct heating. This is a separate category with regard to steam generating equipment. The smoke obtained in Fessmann is characterized in that if the dry steam is changed to wet steam, then the amounts of ethanol, methanol, and oxides thereof such as formaldehyde, acetaldehyde, acetic acid, and formic acid will be expected to increase as a result of the steam, to a greater extent than with other types of smoke. The composition is accordingly different from dry-distilled smoke of the present invention.

3. Smoke-recovery method

The present invention is characterized in providing a chamber for keeping the components recovered in the smoke separated into solids, liquids, and gases. A method is adopted whereby the char (carbonization component) and tar are delivered to the exterior in the state of a dry-distilled gas, while air is prevented from being entrained into via the water surface. Soot and tar in the gas is removed via an extraction port using a spray of water, and the smoke is cooled to approximately ambient temperature, whereby the components that

become liquid at such temperature are removed. A light smoky (and refreshing) aroma is produced, and the smoke can be used without any further contact with air.

Fessmann is characterized in that all of the equipment other than the hopper portion is covered, high-temperature dry steam is produced on the exterior, and the steam is used to apply direct heating to sawdust extruded using a screw via a mesh on the interior of the cover. The invention is accordingly characterized in that the entirety of the generator is enclosed by the cover, and gas exiting via a part of the cover is removed. Thus, Fessmann does not clearly disclose how the char and tar are processed.

The concept of performing pyrolysis without involving combustion is regarded to be the same as with the wood material pyrolysis mechanism of the present invention. With Fessmann, however, high-temperature dry steam used for heating is produced separately from the main unit. It can thus be expected that an endothermic reaction will result from pyrolysis, meaning that the dry steam will change to wet steam. Issues regarding moisture causing a change in the smoke components have already been discussed above. It is thus suggested that the concentration of the smoke will be reduced by the steam. Complications will accordingly ensue in terms of using a structure-related action to prevent air from being entrained. In order for the air to not be entrained, a special-purpose gas other than the exhaust gas and air will need to be re-pumped into the hopper, and the insufficient gas components separately replenished.

In sum, the following are differences between the claimed method of the present invention and Fessmann:

(1) Differences between indirect heating and steam heating;

(2) Differences in regard to the gas generated;

(3) Adding a neutral gas; and

(4) Differences with respect to the method used to isolate char and tar.

With respect to the Smits patent, according to the definition cited in the list of known Japanese food additives, the present invention produces "smoke flavorings" by generating a dry-distilled gas, and dissolving it in an aqueous solution. Smits, by contrast, generates "liquid smoke".

Specifically, the following is a list of known Japanese food additives:

(1) Smoke flavorings:	Dry-distilled gas or other gas obtained by burning sugar cane, bamboo, corn, or wood material
English name:	Smoke flavorings
Other name(s):	Smoke flavor
Application(s):	Manufacturing material
Classification(s):	List of known food additives
(2) Smoke flavorings (pyroligneous acid):	
English name:	Wood vinegar; pyroligneous acid
Source/method of production /main substance:	Obtained by dry-distilling sugar cane, bamboo, corn, or wood material
(3) Smoke flavorings (liquid smoke):	
English name:	Liquid smoke
Source/method of production /main substance:	Obtained by collecting gas components generated by burning sugar cane, bamboo, corn, or wood material in the presence of a limited amount of air
Application(s):	Manufacturing material
Classification(s):	List of known food additives

A feature of smoke suitable for use in foodstuffs is that it is prohibited in all countries except where otherwise expressly recognized, which is common across the world. In the USA, the definition of smoke is restricted to that originating from wood materials, and the HACCP of the EU further limits the definition of wood materials so that the use of plywood (i.e., materials containing adhesives) is also prohibited.

The present invention produces a dry-distilled gas by using a gas in which the smoke flavorings of (1) above have been collected, and dissolving the gas in an aqueous solution. Although Smits employs the smoke-generating device of Fessmann, the discussion relates to

the production of liquid smoke. In the U.S., the process is considered to occur in the presence of a limited amount of air based on the raw material ingredients of liquid smoke, making this process different from the one involving the smoke solution of the present invention.

The following are examples of effects that are typically derived from smoke:

(1) Imparting a unique aroma and taste;

(2) Bringing out and stabilizing color in edible meats;

(3) Preventing the oxidation of fats;

(4) Preventing the proliferation of microorganisms in meats;

(5) Eliminating natural odors (dimethylamine (DMA) and trimethylamine (TMA)); and/or

(6) Other.

The smoke produced by the present invention provides all of the above. In particular, carbon monoxide, nitric oxide, hydrogen sulfide, hydrogen cyanide, ammonia, and pyridine, which are gaseous components of the smoke, are principal materials used in the effect of (2) above (i.e., to bring out and stabilize color in edible meats).

As regards to the smoke flavorings of the present invention, the characteristics are indicated by the facts that, among gas components that are contained in the smoke and contribute to stabilizing the color of meats (i.e., carbon monoxide, nitric oxide, and other poorly soluble gas components (ammonia is soluble and accordingly difficult to extract)), are used with gas components that are perfectly soluble in an aqueous solution (having a solubility degree according to Henry's law) in the form of a perfusate, and that the smoke components are used remove natural odors. This method of use has no precedent.

It has been suggested that the main components of the smoke are not present because they are modified by heated bodies. However, it has been reported by Fischer, Ding. Polyt. 2.38 (1995) that the main components of a typical composition are carbon dioxide (59%),

carbon monoxide (33%), methane (3.5%), hydrogen (3.3%), and pyroligneous acid vapor (1.5%).

The flavoring obtained using the smoke of the present invention is the smoke flavoring indicated in (1), according to the definition and manufacturing method indicated in the list of known Japanese food additives indicated above.

In contrast, the description relating to the admixing of other gases is unclear as regards the smoke flavorings of Smits, despite the description of liquid smoke under (3) above being included, as mentioned in the list.

Accordingly, the present invention uses a gas in which the smoke flavoring of (1) has been collected, and dissolving this gas in an aqueous solution.

The admixing into this gas of any gas that is questionable in regard to foodstuff application is strictly disallowed.

A point of difference in terms of the heating machine structure is that the smoke-generating device of the present invention is provided with a solid/liquid/gas separation device downstream from the indirect heating pipe, and the gas extraction pipe is provided with a device for cooling the gas using a spray of water. The extracted components will thus mainly be poorly soluble gas components. The extracted gas will be largely devoid of undesirable soot and tar, but will retain a suitable level of aroma, can optionally be filtered or otherwise treated to adjust the flavor, and will be dissolved in an additive-containing aqueous solution in a state of no entrained air. Although the gas can dissolve to saturation merely by bubbling, this is a time-intensive procedure from a practical standpoint. Therefore, according to Henry's law, the gas is first dissolved to supersaturation in a pressurized state, whereupon normal pressure conditions are reinstated and the deposited bubbles removed, resulting in a perfusate. The perfusate contains approximately 1 to 1.5% of sodium citrate in order to inhibit blood

coagulation, adjust the pH, and prevent oxidation; 0.1 to 0.5% of sodium L-ascorbate (or sodium erythorbate) as an antioxidant; and 1.0% table salt (sodium chloride). The overall amount will meet or exceed the isotonic concentration of the physiological salt content of fish meat.

A saturated state will accordingly be obtained, wherein the carbon dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, lower hydrocarbons, and other gas components of the smoke will be completely dissolved in the aqueous solution. The blood vessels in the fish will be perfused, and, according to le Chatelier's principle, the soluble fraction will rapidly migrate throughout the fish just like blood. This aspect is regarded to be fundamentally different from that of the Smith smoke flavoring in terms of the purpose of application.

Furthermore, as has been discussed above, a gas has vastly lower resistance compared to a liquid. The difficulty encountered in controlling a gas is that the amount of gas discharged even through an opening roughly the size of a pinhole can either decrease by half or increase by an order of magnitude. Accordingly, using a damper to control the introduction of air, as taught in Fessmann, is wholly impossible. A damper can be regarded as being used to regulate the supply of the smoking material. Therefore, it would be impossible to keep the introduction of air to a minimum after a pressurized screw such as that used in the present invention was used to continuously compress the smoking material. Alternatively, it would be impossible to prevent the introduction of air assuming that the damper would not shield the hopper against generated gases or gases other than the air.

Thus, the methods used by the present invention and Fessmann to achieve this goal accordingly differ from a mechanical structure standpoint. A straightforward description follows, assuming it to be the case that if the pressure in the cover exceeds atmospheric pressure, no air will be entrained in the hopper. In such a case, a countercurrent will be

produced if the smoking material is of low density, and the smoke will be discharged from the hopper.

As discussed above, a damper alone is insufficient to prevent the introduction of air when using a smoking material that contains air. A damper should simply be regarded as having the sole function of regulating the amount of smoking material delivered. The technique of blocking air within a running screw and only allowing the smoking material to pass through is regarded as an unperfected invention.

The ratio of the amount of generated gas (cc) to the wood material (g) is approximately 5000% in an optimal scenario; therefore, even if a small amount of air is entrained, the smoke concentration is likely to change.

For the sake of argument, it might be possible to prevent air from being entrained if the partial pressure inside the cover were adjusted using an external discharge valve and kept at a positive value. However, and conversely, a countercurrent would be formed in the hopper.

For at least the above reasons, Fessmann does not disclose "generating a smoking material from a smoke generating device *into which no air is introduced from* a cast portion for feeding the smoke material and *smoke discharge pa*th" as recited in claim 1.

In addition, Fessmann produces a smoking fluid, which is then subject to fractional distillation in Smits. The Examiner considers this disclosure as corresponding to the "removing at least one unnecessary substance selected from the group consisting of soot and tar from the smoking material under a condition where air is interrupted or air is not introduced" of claim 1. However, claim 1 recites "removing... from the *smoking material...*" whereas a *smoking fluid* is subjected to fractional distillation in Smits. Thus, it seems that Smits does not disclose the removing step of claim 1. In this regard, differences between liquid smoke and smoke flavor are discussed above.

In sum, the focus of Smith is on liquid smoke. This is due to the fact that pyroligneous acid and other smoke components obtained by producing smoke adjusted for its air content are used, and virtually no mention is made in regard to the gas components.

Moreover, the purposes for perfusing frozen fish goods with the smoke flavoring of the present invention are preventing metmyoglobin (browning) during freezing; removing natural odors; and improving taste.

It is respectfully submitted that Smits and Fessmann do not disclose, teach or suggest every element of claim 1 for at least the foregoing reasons.

Additionally, claim 2 depends from claim 1 and thus, it is respectfully submitted that claim 2 is patentable for at least the same reasons as claim 1.

In view of the above, withdrawal of the rejection is respectfully requested.

II. Response to Rejection of Claims 3-17 under 35 U.S.C. § 103(a)

Claims 3-17 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Smits, Fessmann, and further in view of Kenzo (JP 10-179016).

Applicants respectfully traverse the rejection.

It is respectfully submitted that claims 3-6 and 8-17 depend, directly or indirectly, from claim 1, and thus, it is respectfully submitted that these claims are patentable for at least the same reasons as claim 1 and that Kenzo does not make up for the deficiencies of Smits and/or Fessmann.

For the above reasons, it is respectfully submitted that claims 3-17 are patentable over the cited art, and withdrawal of the rejection is respectfully requested.

III. Response to Rejection of Claims 8-17 under 35 U.S.C. § 112, first paragraph

Claims 8-17 are still rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement.

Applicants respectfully traverse the rejection for the reasons of record and the following reasons.

It is respectfully submitted that anti-coagulates that prevent blood from coagulating are well known in the art and one of ordinary skill in the art would recognize that such anti-coagulants could be used in the claimed invention such that one skilled in the art could reasonably conclude that the inventor had possession of the claimed invention.

For example, in the marine product processing industry, citric acid Na for preventing blood from coagulating due to a chelate bond to a calcium ion contained in blood is used as an anti-coagulant adopted in a blood inspection sample.

In the fish processing industry relating to the present invention, there exists a lot of additive permitted to be adopted to blood and having an effect of anti-coagulative of blood, which is used as anti-coagulant. Many antioxidants available in the market are also additives having such effect. As an anti-coagulant to be used in the present invention, for example, a mixed antioxidant consisting of citric acid Na as base material and L-ascorbic acid are used. In that case, an anti-coagulant effect is obtained by citric acid, an antioxidant effect due to a synergy with L-ascorbic acid, and ability of buffering pH.

To support the above position, a partial translation of page 130 extracted from "Fishes Physiology Lecture", vol. 1/ blood and circulation" is submitted herewith. According to the publication, "when a suitable quantity of a potassium oxalate, ammonium oxalate, citric acid soda, or the like is added to blood, it prevents blood from being coagulating. As a result, those are used as a useful anti-coagulant." In addition, partial translations of pages 487 and 488 of an index of additives to food extracted from "Guide to Examination of Dietary Hygiene" issued by the Japan Dietary Hygiene Association, showing that citric acid Na is an additive to food is submitted herewith.

Further, a copy of the USFDA Food Additive Status List is submitted herewith, which shows sodium citrate indicated as a food additive.

In view of the above, withdrawal of the rejection is respectfully requested.

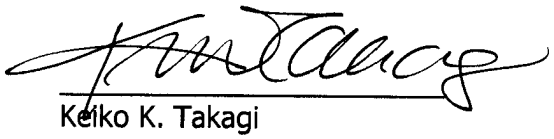
IV. Conclusion

For the foregoing reasons, reconsideration and allowance of claims 1-6 and 8-17 is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Index of food additive names

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Sodium citrate	240

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するメカニズムは明かではない．他の2価の陽イオンの中 $Sr^{\cdot\cdot}$ には $Ca^{\cdot\cdot}$ と同じ作用があるが，$Ba^{\cdot\cdot}$，$Mg^{\cdot\cdot}$ ではこの作用は甚だ弱い．プロトロンビンは肝臓で，ビタミンKの協力で造られる．

トロンビンはアルブミン性の蛋白質である．分離，精製して入手することができる．ビタミンKが欠乏するとプロトロンビンの量が減じ，血液凝固時間が延長する．

（c） $Ca^{\cdot\cdot}$

血液に蓚酸カリ，蓚酸アンモン或はクエン酸ソーダなどを適当量加えると凝固が起らなくなる．それでこれらは有用な凝固防止剤(Anticoaglant)として用いられている．蓚酸カリやクエン酸ソーダは $Ca^{\cdot\cdot}$ と不溶解性の塩を作って，血液中の $Ca^{\cdot\cdot}$ の減少または除去を起こさしめて凝固を防止する．このことから凝固に $Ca^{\cdot\cdot}$ が関与していることが想像される．$Ca^{\cdot\cdot}$ は後述するトロンボキナーゼと一緒に作用してプロトロンビンをトロンビンに変えるのであるが，$Ca^{\cdot\cdot}$ が独立して触媒的に働くのか，$Ca^{\cdot\cdot}$＋トロンボキナーゼが酵素的に働くのかは不明である．流血中には血液凝固を起こすのに充分な量の $Ca^{\cdot\cdot}$ が存在している．血液凝固に影響するほど $Ca^{\cdot\cdot}$ が減少すればこれは強度の血酸症 (Acidosis) であって生存し得ない．それで正常な範囲では $Ca^{\cdot\cdot}$ 減少による凝固延長はみられないのであろう．

（d） トロンボキナーゼ

これは哺乳類の血小板，魚類の栓球中に存在している．血液が硝子，木片，皮膚，空気或はリンゲル液のような異物に触れると凝固し始めるのは，栓球がこわれてその内容物が流出することによる．Morawitz はこのような作用をなすものを1つの酵素と考えてトロンボキナーゼ (Thrombokinase) と呼んだ．この意味は栓球の中にあり，トロンビン形成をなす酵素ということである．Howell も同様な考えからトロンボプラスチンと呼んだ．採血の時用いるものにパラフィンなどを塗布しておくと，これは異物として作用しないために栓球がこわされず，したがって凝固が起こりにくくなる．なおトロンボキナーゼは脳，肝臓その他の組織液中にも含まれていて脂溶性であり，$Ca^{\cdot\cdot}$ の存在の下でプロトロンビンをトロンビンに変える作用をもっている．ただし血清トリプシンや蛇毒もトロンビン形成をなしうるから，このような物質の本体の解決は容易でない．

（e） そ の 他

凝固促進物質として，血漿中にプロトロンビン促進物質の存在が報告されている．命名も異っておりそれらの異同は不明である．グロブリン性のものであろうと考えられている．この物質はトロンビンの作用によって血清プロトロンビン促進物質に変じ，これがプ

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When an appropriate amount of potassium oxalate, ammonium oxalate, sodium citrate or the like is added to blood, coagulation will not occur. These are therefore employed as useful anticoagulants.

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